

Notice of Allowability

Application No.

10/780,131

Examiner

William C. Joyce

Applicant(s)

FU, WEI

Art Unit

3682

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the telephonic interview of 7/18/07.
2. ☒ The allowed claim(s) is/are 21-40.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

EXAMINER' EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Wei Fu on July 18, 2007.

The application has been amended as follows:

-Examiner has cancelled claims 1-20 and added new claims 21-40 as shown below:

21. A rotary shaft hermetic sealing device for providing dynamically hermetic sealing for a rotary shaft and to fully transfer the torque under various rpm's comprising:

means for holding a coupler drive bearing to provide rotational freedom to a coupler drive shaft of a center shaft coupler;

means for holding a coupler load bearing to provide rotational freedom to a coupler load shaft of said center shaft coupler;

means for transmitting motion between a drive crank shaft and said center shaft coupler;

means for transmitting motion between said center shaft coupler and a load crank shaft;

means for holding rubber seals to provide hermetic sealing, rigidly connected to said means for transmitting motion between said center shaft coupler and said load crank shaft, and rigidly connected to said means for transmitting motion between said drive crank shaft and said center shaft coupler;

means for providing a solid, common base for said drive crank shaft and said load crank shaft;

means for sealing said drive crank shaft from fluid leakage, sealingly mounted to said means for holding rubber seals to provide hermetic sealing;

means for sealing said load crank shaft from fluid leakage, sealingly mounted to said means for holding rubber seals to provide hermetic sealing;

means for providing solid support base for said drive crank shaft during operation, sealingly mounted to said means for sealing said drive crank shaft from fluid leakage;

means for providing solid support base for said load crank shaft during operation, sealingly mounted to said means for sealing said load crank shaft from fluid leakage;

means for providing rotational inertia balance due to a eccentric bore on said drive crank shaft, adjustably mounted to said means for holding said coupler drive bearing to provide rotational freedom to said coupler drive shaft of said center shaft coupler;

means for providing rotational inertia balance due to a eccentric bore on said load crank shaft, adjustably mounted to said means for holding said coupler load bearing to provide rotational freedom to said coupler load shaft of said center shaft coupler;

means for adjusting the total balance weight to reduce vibration, removably mounted to said means for providing rotational inertia balance due to said eccentric bore on said drive crank shaft; and

means for adjusting the total balance weight to reduce vibration, removably mounted to said means for providing rotational inertia balance due to said eccentric bore on said load crank shaft.

22. The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for holding said coupler drive bearing to provide rotational freedom to said coupler drive shaft of said center shaft coupler comprises said drive crank shaft, having high stiffness.

23 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for holding said coupler load bearing to provide rotational freedom to said coupler load shaft of said center shaft coupler comprises said load crank shaft, having high stiffness.

24 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for transmitting motion between said drive crank shaft and said center shaft coupler comprises a solid coupler drive shaft, having high bending modulus and high stiffness.

25 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for transmitting motion between said center shaft coupler and said load crank shaft comprises a solid coupler load shaft, having high bending modulus and high stiffness.

26 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for holding rubber seals to provide hermetic sealing comprises a rigid coupler sealing disk.

27 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for providing said solid, common base for said drive crank shaft and said load crank shaft comprises a rigid housing.

28 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for sealing said drive crank shaft from fluid leakage comprises a deformable drive rubber seal.

29 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for sealing said load crank shaft from fluid leakage comprises a deformable load rubber seal.

30 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for providing said solid support base for said drive crank shaft during operation comprises a drive shaft support, having a center bore to hold a drive shaft support bearing.

31 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for providing said solid support base for said load crank shaft during operation comprises a load shaft support, having a center bore to hold a load shaft support bearing.

32 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for providing rotational inertia balance due to said eccentric bore on said drive crank shaft comprises a drive balance base.

33 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for providing rotational inertia balance due to said eccentric bore on a load crank shaft comprises a load balance base.

34 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for adjusting the total balance weight to reduce vibration comprises a drive balance adjust weight.

35 The rotary shaft hermetic sealing device in accordance with claim 21, wherein said means for adjusting the total balance weight to reduce vibration comprises a load balance adjust weight.

36 A rotary shaft hermetic sealing device for providing dynamically hermetic sealing for a rotary shaft and to fully transfer the torque under various rpm's comprising:

 a drive crank shaft, having high stiffness, for holding a coupler drive bearing to provide rotational freedom to a coupler drive shaft of a center shaft coupler;

 a load crank shaft, having high stiffness, for holding a coupler load bearing to provide rotational freedom to a coupler load shaft of a center shaft coupler;

 a solid coupler drive shaft, having high bending modulus and high stiffness, for transmitting motion between said drive crank shaft and said center shaft coupler;

a solid coupler load shaft, having high bending modulus and high stiffness, for transmitting motion between said center shaft coupler and said load crank shaft;

a rigid coupler sealing disk, for holding rubber seals to provide hermetic sealing, rigidly connected to said coupler load shaft, and rigidly connected to said coupler drive shaft;

a rigid housing, for providing a solid, common base for said drive crank shaft and said load crank shaft;

a drive rubber seal, being deformable, for sealing said drive crank shaft from fluid leakage, sealingly mounted to said coupler sealing disk;

a load rubber seal, being deformable, for sealing said load crank shaft from fluid leakage, sealingly mounted to said coupler sealing disk;

a drive shaft support, having a center bore to hold a drive shaft support bearing, for providing solid support base for said drive crank shaft during operation, sealingly mounted to said drive rubber seal;

a load shaft support, having a center bore to hold a load shaft support bearing, for providing solid support base for said load crank shaft during operation, sealingly mounted to said load rubber seal;

a drive balance base, for providing rotational inertia balance due to a eccentric bore on said drive crank shaft, adjustably mounted to said drive crank shaft;

a load balance base, for providing rotational inertia balance due to a eccentric bore on said load crank shaft, adjustably mounted to said load crank shaft;

a drive balance adjust weight, for adjusting the total balance weight to reduce vibration, removably mounted to said drive balance base; and

a load balance adjust weight, for adjusting the total balance weight to reduce vibration, removably mounted to said load balance base.

37 The rotary shaft hermetic sealing device as recited in claim 36, further comprising: a left housing cover, for connecting the housing and said drive shaft support to form a common solid base for the device.

38 The rotary shaft hermetic sealing device as recited in claim 36, further comprising: a right housing cover, for connecting the housing and said load shaft support to form a common solid base for the device.

39 The rotary shaft hermetic sealing device as recited in claim 36, further comprising: a sensor, for detecting leaking fluid, removably mounted to said housing.

40 A rotary shaft hermetic sealing device for providing

dynamically hermetic sealing for a rotary shaft and to fully transfer the torque under various rpm's comprising:

a solid drive crank shaft, having high bending modulus and high stiffness and a large end having an eccentric bore, for holding a coupler drive bearing to provide rotational freedom to a coupler drive shaft of a center shaft coupler;

a solid load crank shaft, having high bending modulus and high stiffness and a large end having an eccentric bore, for holding a coupler load bearing to provide rotational freedom to a coupler load shaft of said center shaft coupler;

a solid coupler drive shaft, having high bending modulus and high stiffness, for transmitting motion between said drive crank shaft and said center shaft coupler;

a solid coupler load shaft, having high bending modulus and high stiffness, for transmitting motion between said center shaft coupler and said load crank shaft;

a rigid coupler sealing disk, having high bending modulus and high stiffness and a flat surface on both sides and mounting screw holes on both sides, for holding rubber seals to provide hermetic sealing, rigidly connected to said coupler load shaft, and rigidly connected to said coupler drive shaft;

a rigid housing, having a flat edge and tapped screw holes and a sensor mounting hole, for providing a solid, common base for said drive crank shaft and said load crank shaft;

an elastic drive rubber seal, being fabric reinforced and deformable and having a flexible metal wire coat, for sealing said drive crank shaft from fluid leakage, sealingly mounted to said coupler sealing disk;

an elastic load rubber seal, being fabric reinforced and deformable and having a flexible metal wire coat, for sealing said load crank shaft from fluid leakage, sealingly mounted to said coupler sealing disk;

a solid drive shaft support, having a center bore to hold a drive shaft support bearing and mounting screw holes and a flat surface, for providing a solid support base for said drive crank shaft during operation, sealingly mounted to said drive rubber seal;

a solid load shaft support, having a center bore to hold a load shaft support bearing and mounting screw holes and a flat surface, for providing a solid support base for said load crank shaft during operation, sealingly mounted to said load rubber seal;

a drive balance base, being removeable and adjustable, for providing rotational inertia balance due to an eccentric bore on said drive crank shaft, adjustably mounted to said drive crank shaft;

a load balance base, being removeable and adjustable, for providing rotational inertia balance due to an eccentric bore on said load crank shaft, adjustably mounted to said load crank shaft;

a drive balance adjust weight, being removeable and adjustable and having high density, for adjusting the total balance weight to reduce vibration, removably mounted to said drive balance base;

a load balance adjust weight, being removeable and adjustable and having high density, for adjusting the total balance weight to reduce vibration, removably mounted to said load balance base;

a rigid left housing cover, being removeable and having a flat surface and mounting screw holes, for connecting the housing and said drive shaft support to form a common solid base for the device;

a rigid right housing cover, being removeable and having a flat surface and mounting screw holes, for connecting the housing and said load shaft support to form a common solid base for the device; and

a sensor, being detachable, for detecting leaking fluid, removably mounted to said housing.

2. The following is an examiner's statement of reasons for allowance: The prior art does not teach a hermetic sealing device as defined by the claims. It was known to provide sealing devices for rotary shafts (see cited references), however the prior art does not show the combination of features as defined by the claims. For example, the prior art does not teach the features of claim 20 of a sealing device having: a solid drive crank shaft, a solid load crank shaft, a solid coupler drive shaft for transmitting motion between said drive crank shaft and said center shaft coupler, a solid coupler load shaft

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for transmitting motion between said center shaft coupler and said load crank shaft, a rigid coupler sealing disk, a rigid housing, an elastic drive rubber seal, an elastic load rubber seal, a solid drive shaft support, a solid load shaft support, a drive balance base, a load balance base, a drive balance adjust weight, a load balance adjust weight, a rigid left housing cover, a rigid right housing cover, and a sensor. Accordingly, the claims are allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Joyce whose telephone number is (571) 272-7107. The examiner can normally be reached on Monday - Thursday 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on (571) 272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

 7/23/07
William C. Joyce